5. Variance Application and Issuance Process

5.1 Application Process for Coverage under the MDV

Once it is approved by EPA, permitted point sources in the Willamette are eligible to apply for coverage under the multiple discharger variance. Permittees should apply for variance coverage concurrent with applying for permit renewal. Managing these processes together will create efficiencies for both DEQ staff and for the permittee. Moreover, required public notice and comment periods can be done simultaneously.

Each permittee shall provide the following information:

- Information about the facility's treatment system, including their technology, the location of their discharge point, and whether they have a pretreatment program.
- The most recent mercury effluent data (five years, or as much as available, but not less than two years).
- Other available mercury data from the previous five years, including influent data, biosolids data, and any other data collected to track mercury sources. Such data will assist DEQ in supporting its decision to justify the variance application.
- A description of prior mercury minimization efforts. This could include copies of any mercury minimization plan progress reports that have been submitted under the previous permit cycle, if they are available.
- A draft MMP that will cover the period of the permit (See Chapter 6 for further discussion). DEQ permit staff will work with the permittee to ensure that the MMP meets DEQ requirements before the final permit and variance authorization are issued

5.2 Highest Attainable Condition under the MDV

Variance requirements are designed to achieve the highest attainable condition during the term of the variance. The HAC may be expressed in one of three ways under federal variance rules.[1] HAC #1 is expressed as "the highest attainable interim condition," and establishes an alternate instream criterion for the term of the variance. HAC #1 is appropriate if the water body is well modeled and the attainable condition is known. DEQ determined that HAC #1 is not appropriate for the Willamette Mercury MDV. There is significant uncertainty about what concentrations of mercury can be attained in the Willamette Basin during the variance term, due to ongoing deposition of airborne mercury, the variety of sources and pathways by which mercury enters the waterbodies, and the very small portion of the load contributed by point sources.

[1] 40 CFR Part 131.14(b)(1)(ii)

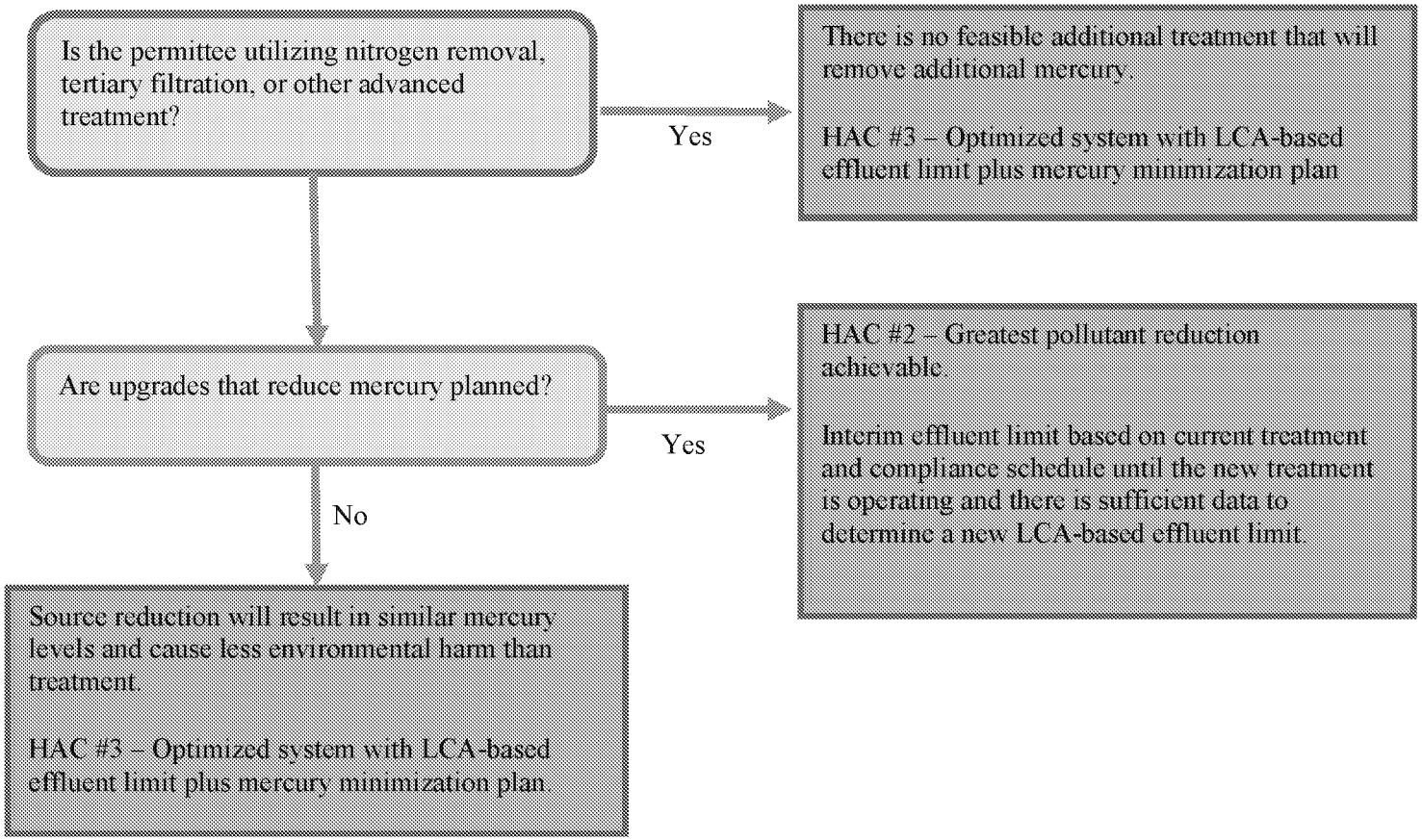
HAC #2 and #3 express the highest achievable effluent condition as a proxy for an in-water criterion. HAC #2 is "the interim effluent condition that reflects the greatest pollutant reduction achievable." This option is appropriate for permittees that are planning a treatment upgrade that will result in mercury reductions. HAC #3 applies "if no additional feasible pollutant control technology can be identified," in which case the HAC is "the interim criterion or interim effluent condition that reflects the greatest pollutant reduction achievable with the pollutant control technologies installed at the time the state adopts the WQS variance and the adoption and implementation of a pollutant minimization plan."[2] Under the federal regulations, neither HAC #2 nor #3 are allowed to result in a lowering of the currently attained ambient water quality.

As described below, DEQ has determined that under the Willamette Basin Mercury MDV, HAC #3 is appropriate for most dischargers because either: 1) additional pollutant control technology does not exist, as is the case for facilities already utilizing advanced treatment, or 2) a treatment upgrade would not result in substantially different effluent concentrations as source control and would cause more environmental harm than source reduction.

The following flow chart and description outlines the process that DEQ would use to determine the appropriate HAC option for each facility covered under the Willamette Basin Mercury MDV (Figure 5-1). A description of each decision follows.

[2] 40 CFR 131.14(b)(ii)(A)

Figure 5-1. Proposed Procedure to Determine Highest Attainable Condition



5.2.1. Facilities with advanced treatment

For facilities with advanced wastewater treatment, there is no feasible technological upgrade that will significantly reduce mercury loads in a discharger's effluent, as demonstrated in Chapter 3. Thus, for these facilities, HAC #3 is appropriate. Based on available data provided in Section 4.2, such systems are capable of achieving annual average mercury concentrations of 3.5 ng/L or below. DEQ will include permit effluent limits based on the level currently achievable, using the methodology in Appendix B, and require the facility to develop and implement an MMP, including monitoring and reporting requirements, as described in Section 6.

5.2.2. Facilities that are planning upgrades that reduce mercury levels

In some cases, a facility may be upgrading its treatment to reduce a variety of pollutants, including mercury. For such facilities, HAC #2 ("the greatest pollutant reduction achievable") is appropriate. Until the upgrade is operational, DEQ will still require an effluent limit based on the level currently achievable with the current technology. DEQ will continue to utilize this effluent limit until the new system has been operational for two years. During the first two years of operation, DEQ will require the operator to analyze its influent and effluent for mercury at least quarterly for two years. Once there is sufficient effluent data, DEQ will then modify the permit with a new permit level based on these mercury concentrations. Influent data will assist DEQ and the permittee in understanding removal efficiency and how MMP implementation results in decreased amounts of mercury coming to the facility. In some cases, DEQ may wait until the next permit renewal to update the effluent limit.

5.2.3. All other facilities without advanced treatment

As demonstrated in this section, DEQ concluded that, during the twenty year term of the variance, MMP implementation will result in similar effluent concentrations as treatment and will result in fewer harmful environmental outcomes. Thus, HAC #3 will apply to any facilities without advanced treatment and which are not planning an upgrade that will reduce mercury levels. Effluent limits will be developed using the process developed described in Section 7.1.1 and MMP implementation will be required as described in Section 7.3.

Rationale for Using HAC #3 – MMP implementation will achieve similar effluent concentration as advanced wastewater treatment plants and will result in less environmental harm than treatment

Demonstration that MMP implementation will achieve similar effluent concentrations as advanced wastewater treatment plants

As described in section 4.2.2, municipalities using advanced wastewater treatment (either tertiary filtration or nutrient removal) have mercury effluent concentrations ranging from 1-3.5 ng/L as an annual average. DEQ has concluded that there are no current feasible technologies that have been demonstrated to achieve lower mercury effluent concentrations.

Some secondary treatment plants have higher mercury concentrations in their effluent than advanced system. Data indicates that over the 20-year proposed term of the variance, appropriate implementation of an MMP at most facilities without advanced treatment will result in similar mercury concentrations as

that achieved at advanced treatment plants. In fact, many secondary treatment plants are already achieving such levels.

The Wisconsin Department of Natural Resources has tracked mercury effluent data from NPDES permittees over the past fifteen years, during which NPDES permitted facilities have been implementing MMPs under the Great Lakes Initiative. The data show that both municipal and industrial point sources have reduced mercury effluent concentrations through MMP implementation. Most municipal facilities have achieved mercury reductions to the point that they are achieving similar concentrations to those found at advanced wastewater treatment plants in Oregon.

WDNR examined long term trends in mercury concentrations. All but three municipal systems saw decreasing trends in effluent concentrations (Figure 6-2). Moreover, whereas 13 facilities had 4-day P99s (99th percentile of 4-day average mercury concentrations) greater than 8 ng/L in their initial permit term, only one facility had a 4-day P99 based on the most recent data (Figure 6-3), highlighting how effluent levels have decreased over time. The mercury concentrations seen in most of these facilities are within the range that are seen in advanced municipal wastewater treatment plants. According to WDNR staff, none of these facilities employ advanced filtration, but have achieved these levels through minimization.[3]

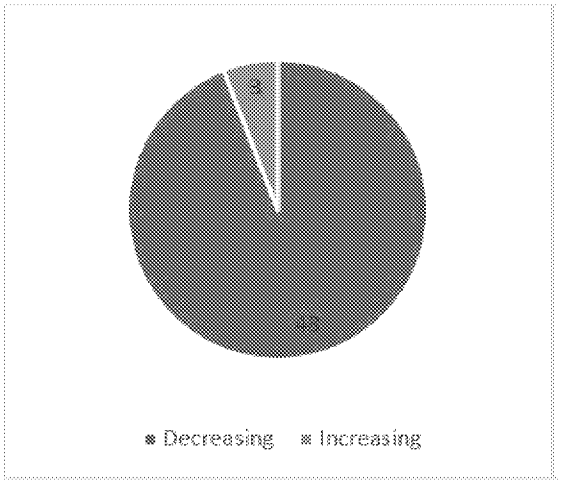


Figure 5-2. Number of Wisconsin municipal wastewater treatment systems with increasing and decreasing trends in annual average effluent mercury concentrations. Source: Wisconsin Department of Natural Resources.

[3] *Personal communication*, Laura Dietrich, Wisconsin Department of Natural Resources, 2/28/19.

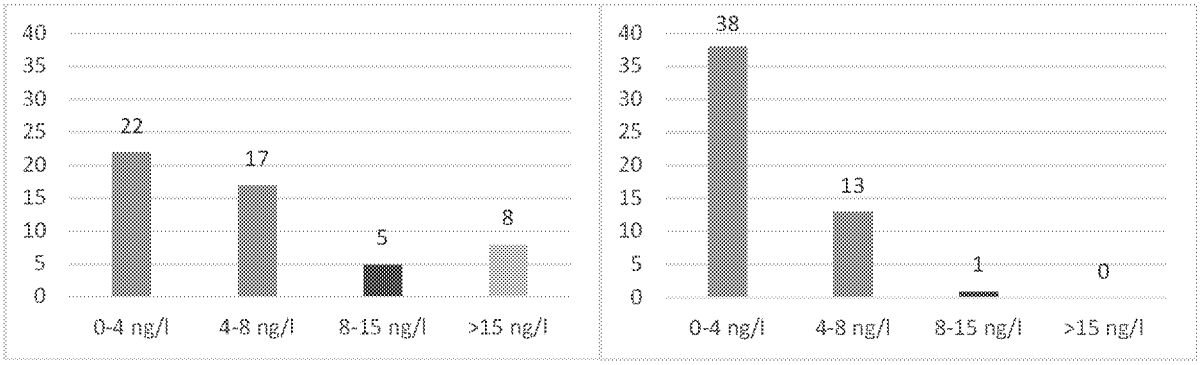


Figure 5-3. Number of Wisconsin municipal WWTPs by 4-day P99 mercury concentrations from initial five-year period (left) to most recent five-year period (right). Source: Wisconsin Department of Natural Resources.

Available data in Wisconsin also indicates an overall decreasing trend in mercury concentrations at industrial facilities. Among 24 industrial NPDES permit holders, the mean 4-day P99 decreased from 25.4 to 13.7 ng/L and the median 4-day P99 decreased from 14.1 to 7.2 ng/L. Sixteen of the 24 facilities had decreasing average mercury concentrations (Figure 6-4). Finally, while only one additional facility had a 4-day P99 less than 8 ng/L from the initial five-year period to the most recent, five fewer facilities had concentrations greater than 15 ng/L (Figure 6-5.

Industrial facilities in the Willamette Basin contribute approximately 0.3% of the total load of mercury to the Willamette. Moreover, these facilities have effluent levels of mercury that average less than 15 ng/L. Given the high environmental costs of treatment (as demonstrated in the section below), the effectiveness of source reduction and the small contribution to the overall load, DEQ has concluded that it is preferential for such facilities to focus on MMP implementation, rather than trying to upgrade treatment.

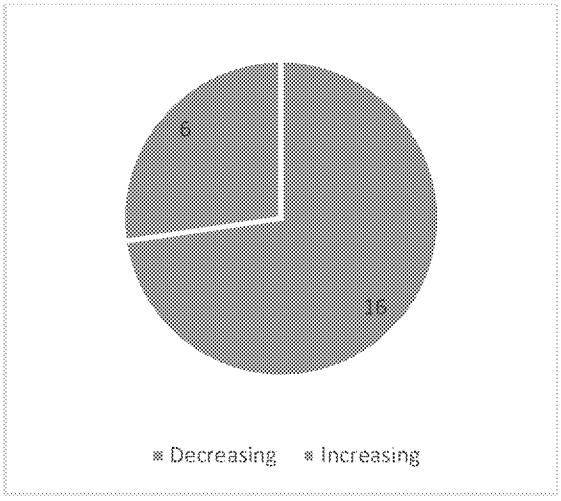


Figure 5-4. Number of Wisconsin industrial wastewater treatment systems with increasing and decreasing trends in annual average mercury effluent concentrations. Source: Wisconsin Department of Natural Resources.

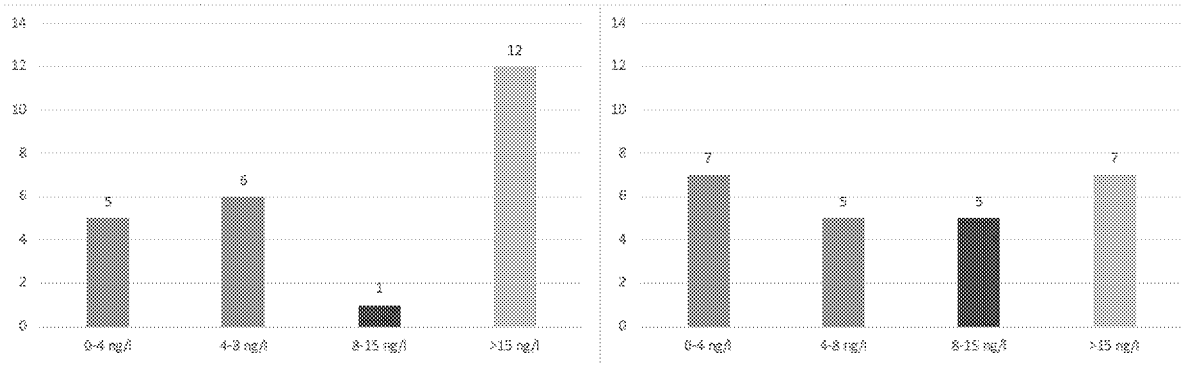


Figure 5-5. Number of Wisconsin industrial NPDES facilities by 4-day P99 mercury concentrations from initial five-year period (left) to most recent five-year period (right). Source: Wisconsin Department of Natural Resources.

Evidence from influent and biosolids data also indicates the effectiveness of MMPs in reducing mercury, even when effluent levels are variable. A decade of mercury influent data from 72 major NPDES wastewater treatment plants in Minnesota indicate that MMPs have resulted in significant and continued reductions in mercury concentrations entering treatment systems. Between 2008 and 2017, influent total mercury concentrations decreased from an average of 180 ng/l to 70 ng/l (Figure 6-5). Finally, data from the Rock Creek Advanced Wastewater Treatment Plant operated by Clean Water Services indicates decreasing mercury levels in biosolids, showing the effectiveness of their mercury reduction efforts over the last 20 years (Figure 6-6).

Figure 5-6. Influent Data from Major Wastewater Treatment Plants in Minnesota. Source: Minnesota Pollution Control Agency

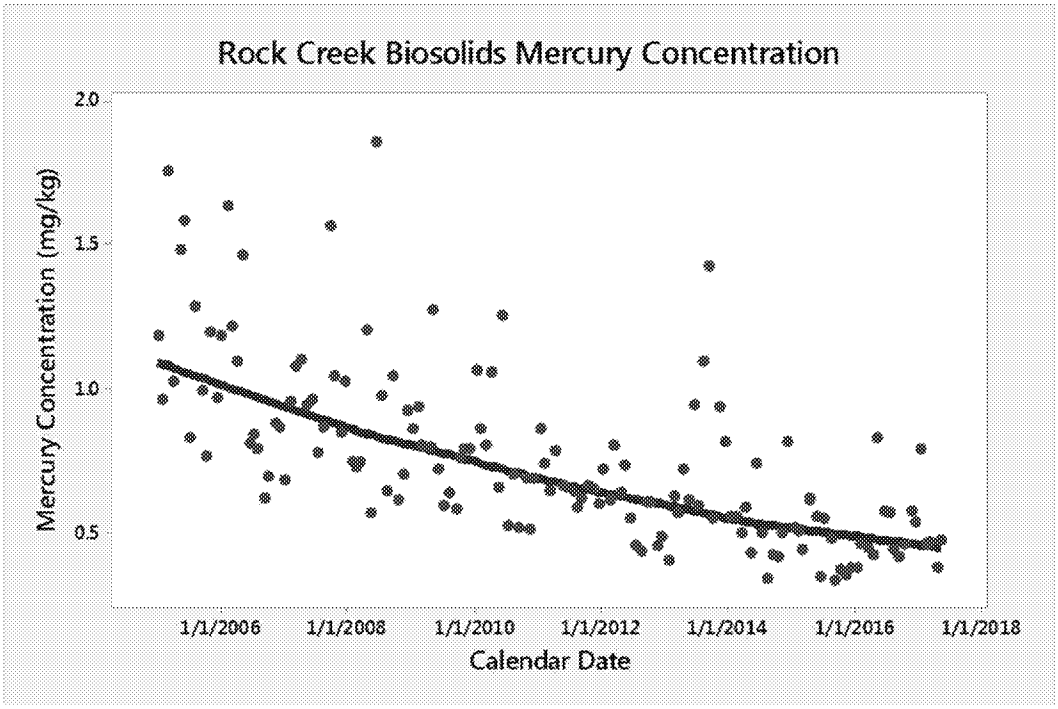


Figure 5-7. Mercury Concentrations in Biosolids, Rock Creek Wastewater Treatment Plan. Source: Clean Water Services.

MMP implementation will result in less environmental damage than treatment

While source reduction can attain similar levels as treatment, it also has less environmental harm than treatment. Environmental costs associated with treatment include greater energy use and additions to greenhouse gas emissions, as well as the need for additional waste disposal outweigh any benefit that might come from treatment to reduce mercury.[4]

According to a report from the Water Research Foundation and Electric Power Research Institute, daily energy consumption at advanced treatment plants is about 500-600 kwh per million gallons per day higher than that of secondary activated sludge plants.[5] Thus, for the smallest facility likely to need a variance (those with approximately 1 MGD design flow), the additional annual energy consumption to upgrade to advanced treatment is 219 megawatt-hours per year. This equates to an annual carbon footprint increase of approximately 125 metric tons carbon dioxide equivalent per year.[6] According to U.S. EPA's analysis of the social costs of one metric ton of greenhouse gas emissions in 2020 dollars ranges from $12 to $123[7]. The increased energy consumption at a smaller plant covered by the variance would have a social cost ranging from $1,500 to $15,375 per year, while having a similar outcome to source reduction. For larger facilities that may receive coverage under the variance, additional treatment could equate to as

[4] DEQ acknowledges that treatment upgrades are sometimes necessary for reasons other than mercury removal. This possibility is incorporated into the procedure for Highest Attainable Condition described in Chapter 6.
[5] Electric Power Research Institute and Water Research Foundation. 2013. Electricity Use and Management in the Municipal Water Supply and Wastewater Industries. 194 pp.
[6] To calculate the annual carbon footprint, DEQ utilized carbon footprint information utilized in the 2019 Triple Bottom Line analysis to support the chloride and mercury variance for the city of Madison, Wisconsin.
[7] https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html

much as 5000 metric tons CO_2 equivalent per year released into the environment. Additional waste disposal required by wastewater treatment would add additional carbon footprint due to the need to haul additional material. Moreover, waste disposal would result in land application of material with concentrated mercury, which would potentially be re-released to the environment.

The total mercury load from all point sources to rivers in the Willamette Basin is 1.6 kg/year[8], or about 1% of the total annual load of mercury to the basin. Treatment upgrades at the estimated number of facilities with higher mercury concentrations would only reduce a portion of this load, which would also likely be achieved eventually through source reduction without the associated environmental cost. Therefore, DEQ has concluded that the additional energy costs associated with treatment would cause more environmental harm than removing similar amounts of mercury load through source reduction, even though the source reduction may take more time.

5.3 HAC Re-evaluation Process

Federal variance rules require that DEQ re-evaluate the HAC at least every five years. The HAC re-evaluation process provides the permittee the opportunity to document the success of mercury minimization efforts and update its MMP for the next permit cycle. Re-evaluation also provides DEQ the opportunity to determine if source reduction efforts have resulted in progress toward meeting the water quality standard, as well as to recalculate the LCA and associated effluent limit.

The permittee should request for continued authorization under the MDV as part of its permit renewal application. As part of the application requesting re-authorization under the MDV, the applicant should provide:

- A summary of all mercury data collected during the previous permit cycle, including influent, effluent, and Biosolids data, as well as any source tracking data collected.
- Supporting analysis of available data indicating progress in reducing mercury concentrations in effluent, influent and biosolids.
- A description of mercury minimization efforts conducted under the previous variance cycle and any information supporting how these efforts contributed to mercury reductions. This could include copies of any MMP progress reports that have been submitted under the previous permit cycle.
- Updates to the MMP covering the next permit cycle.

DEQ will evaluate the information provided. When the permit is renewed, DEQ will then re-calculate the LCA based on effluent data collected during the previous five years and incorporate that information into the permit fact sheet. DEQ then will establish an updated interim effluent limit based on the more recent data, as described in 6.2.1.1.

As part of re-evaluation, DEQ will examine data provided by the permittee to assess whether source reduction activities have resulted in mercury reductions. DEQ may look at overall trends in influent, effluent and other data. If mercury levels have not decreased significantly from one permit cycle to the next, DEQ may ask the permittee to increase source reduction efforts, through increased inspections,

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monitoring of the collection system, investigation of materials, etc. DEQ will ask the permittee to commit to these efforts in its MMP.

6. Variance Requirements

6.1 General variance requirements

The following section discusses variance requirements that will be incorporated into each permit.

6.1.1 Interim Effluent Limits

6.1.1.1 Interim Effluent Limit Reflecting Greatest Pollution Reduction with Optimized Installed Treatment

(to be incorporated)

6.1.1.2 Interim Effluent Limit Reflecting Greatest Pollution Reduction Achievable

In limited cases, a permittee may need to upgrade treatment to address pollutants other than mercury, but which may also result in additional mercury removal from effluent. In this case, the variance should reflect HAC #2 ("greatest pollutant reduction achievable") as a result of the upgrade. In such cases, until the facility has installed upgraded treatment, the interim effluent limit should reflect the level currently achievable using the procedure outlined in 7.1.1.1.

Once upgraded treatment is operating, there will still be sufficient uncertainty about mercury levels that the upgraded facility will reach. As a result, DEQ proposes to maintain the interim effluent limit that was in place prior to the upgrade and require the facility to collect a minimum of quarterly effluent samples for mercury. Once there is sufficient data, DEQ will determine an updated limit based on the procedure in Section 7.1.1.1. This limit will be incorporated into a permit modification or a renewed permit depending on when during the permit term there is sufficient data to develop an updated limit.

6.1.2 Monitoring requirements

DEQ will incorporate effluent monitoring requirements into the permit to ensure compliance with the LCA-based interim effluent limit. DEQ will require quarterly mercury effluent monitoring for each facility. Many facilities already collect mercury effluent data under pre-treatment programs or current permit requirements. This data will be sufficient to meet monitoring requirements for the variance. In addition, for purposes of the variance and implementing a MMP, quarterly influent samples, to be collected at the same time as the effluent samples, will also be required. This allows DEQ and the permittee to track progress in mercury reductions that are often seen in influent, but does not correlate with decreased effluent levels.

DEQ also acknowledges the variability of mercury, particularly when dealing with such small concentrations. Therefore, permits will allow collection of additional data, which will then be averaged with other data collected within a year in order to determine compliance with the annual average effluent limit.

6.1.3 Implementation of a Mercury Minimization Plan

DEQ will include a requirement in the permit to implement an MMP, as described in Section 7.2. The MMP must cover the term of the variance, which we estimate will be in the year 2040. DEQ understands that it will be difficult to provide specificity to activities more than five years in the future. DEQ expects that the discharger will provide greater detail about activities that will be done in the permit term under consideration and describe more generally the types of activities that it will take under future permit terms.

6.1.4 Annual progress reports

The permit will require an annual progress report. The progress report should include, at a minimum, the following information:

- All mercury data collected over the course of each year of the permit cycle. This would include influent and effluent data
- A summary of activities conducted under the MMP; and
- Any nonpoint best management practices done under the authority of the permittee to address mercury loads.

6.2 Mercury Minimization Plans

Any permittee receiving coverage under the permit will submit an MMP as part of their variance application. The MMP must be tailored to the facility's potential to discharge mercury. The MMP should reflect the guidance in DEQ's Internal Management Directive on Implementation of the Methyl-mercury Criterion in NPDES Permits.

6.2.1 Timing to develop an MMP

The MMP should be submitted to DEQ as part of application for coverage under the variance. Because MMP implementation will be part of the permit terms and conditions under the MDV, it will need to undergo public comment along with DEQ's review and findings and the resultant requirements of the variance, which are included as requirements of the permit. DEQ permit staff will work with the facility to ensure that the MMP meets DEQ requirements and expectations.

6.2.2 Duration of Activities Described in the MMP

Under federal variance requirements, States must describe pollutant control activities, including those identified through an MMP, that it anticipates implementing throughout the variance term to achieve the highest attainable condition. Consistent with that requirement, DEQ will require that the permittee

describe activities that it will implement under the MMP for the duration of the variance authorization. If the permittee only requests authorization under the MDV for a full permit term, activities in the MMP would only have to cover that permit term. If, on the other hand, the permittee requests coverage for the entire term of the variance (i.e., 20 years), the MMP would have to cover the entire term.

DEQ understands that it will be challenging, particularly during the earlier part of the twenty-year variance term, to describe source reduction activities that a permittee will implement 15 to 20 years in the future. DEQ will require more detail for activities that will occur during the term of the permit for which the MDV coverage is being authorized, and allow broader, more general descriptions of potential activities that will occur in future dates. DEQ expects that when the permit is renewed, the MMP will be revised to incorporate additional detail regarding what will occur during the next permit term.

For example, a municipal discharger may commit to contacting all dental facilities in their collection system to ensure they are recycling used amalgam during the first five years of variance authorization. Then they may identify for years 6-20 of the variance term that they will address additional sectors, such as educational facilities, salvage operations and medical facilities, as well as re-visiting dental offices on sporadic basis. During re-evaluation of the variance for the next permit cycle, DEQ would then look for the facility to update the MMP with more specificity about these efforts, such as committing to outreach and site visits to educational institutions.

6.2.3 Contents of the MMP

The facility should utilize DEQ's IMD to guide development of the contents of the MMP. The plan should be tailored to each facility, and to the duration that the facility has been implementing prior MMPs. A municipal facility developing its first IMD may focus its efforts on developing an inventory of potential mercury sources, such as those from dental, medical and educational facilities; public education and outreach; and limited contacts with organizations in its inventory. A municipal facility that has been implementing an MMP for 10 years or more may focus on sources that have not yet been addressed, even though they have a lower risk of contributing mercury, as well as maintaining its current outreach efforts. An industrial facility may focus initial efforts on identifying materials that may be a source of mercury, whereas later efforts may focus on actual material substitution or waste recycling. In either case, the MMP should also describe any monitoring that will be conducted, including compliance monitoring under the permit.

6.2.4 Requirements for facilities with increasing mercury effluent concentrations

As demonstrated in Section 6.2, MMP implementation typically results in reductions in mercury effluent concentrations over the course of 10-15 years. However, effluent mercury concentrations may trend upwards in some facilities from one permit term to the next. If, during the HAC re-evaluation process, DEQ finds that average effluent concentrations have significantly increased from one permit term to the next, DEQ may require the facility to include more specific commitments in its MMP, including additional facility audits, or collection system monitoring to identify what is causing the increased concentration and to address the sources of mercury.